PREDICTING CONSISTENT CONTRACEPTIVE USE AMONG ADOLESCENTS

Mary Lou Balassone, DSW
School of Social Work
University of Washington

The research reported here contributes to a growing literature concerned with understanding the determinants of consistent and effective contraceptive use among adolescents. Each year, over one million U.S. teenagers become pregnant and 80% of these pregnancies are unplanned (Alan Guttmacher Institute, 1981; Hayes, 1987). The pregnancy rate among American adolescents is higher than any other western, industrialized country (Hayes, 1987).

Trends related to adolescent sexuality and contraceptive use help explain the high incidence of teenage pregnancy in this country. First, the rate of sexual activity among teens increased significantly through the 1970's (Alan Guttmacher Institute, 1981; Baldwin, 1982), although it appears to have leveled off in the past few years (Hayes, 1987). Over 70% of females and over 80% of males are sexually experienced by age 20 (Alan Guttmacher Institute, 1981; Hayes, 1987). Second, sexually active adolescents are not using contraception consistently or effectively. Estimates of the non-use or ineffective use of contraception among sexually active teens range from 30% to 60% (Clark, Zabin, & Hardy, 1984; Cohen & Rose, 1984; Dryfoos, 1982; Furstenberg et al., 1983; Shah & Zelnik, 1980). In 1982, 85% of sexually active adolescents reported have used contraception at least once, but 40% of these teens said that they used contraception only "sometimes" (Hayes, 1987). These trends show a substantial number of teens to be at risk of unintended pregnancy and highlight the need for a better understanding of contraceptive behavior among adolescents.

This research grew out of the author's social work practice experience with pregnant and parent adolescents. The need for more complete knowledge regarding birth control use is most apparent when working with teens who experience repeated pregnancies. A startling 17% of teens have a repeat pregnancy within a year following the termination of the initial pregnancy (Ford, 1983); almost 30% will get pregnant within two years (Hayes, 1987). Most teens who have subsequent pregnancies report a desire to postpone additional pregnancies and may even begin using birth control. Unfortunately, it is likely for these teens to discontinue using contraception and place themselves at risk for pregnancy.

Most of the previous empirical work on birth control use has been confined to a search for factors correlated with the non-use of contraception (see Hofmann, 1984 & Morrison, 1985 for reviews of this work). Less attention has been devoted to understanding contraceptive discontinuation.

Furstenberg and has associates (1983) report that 18% to 57% of teens discontinue their use of birth control within a year. Most of these adolescents stop using a method during the initial months of use. A number of studies have focused on inconsistent birth control use among teens (Durant et al., 1984; Furstenberg et al., 1983; Foreit & Foreit, 1981; Litt et al., 1980; Mindick & Oskamp, 1982; Nathanson & Becker, 1985; Scher et al., 1982; Shea et al., 1984). Variables found to be correlated with contraceptive discontinuation include: younger ages, minority status, failure to use birth control at first intercourse, having had an abortion, lower educational aspirations, low levels of personal health, feelings of helplessness, lack of a steady sexual partner, problems or dissatisfaction with method, failure to make or pay for the initial family planning visit, and parents who do not know of the teen's use of birth control.

This prospective study employed a sample of teen oral contraceptive users to predict clinic return and to investigate correlates of continued use of birth control. Family planning practitioners cite high rates of non-return to the clinic among adolescent clients (Dryfoos, 1983). Teens who begin using birth control but fail to return for scheduled reproductive health exams are often inconsistent users of contraception (Shea et al., 1984). The research question addressed was: What factors (demographic, psychosocial, medical) place teens at risk for non-return to the family planning clinic and discontinuation of contraceptive use? The goal of this research was to provide information that will assist practitioners in identifying teens at-risk for discontinuing their use of birth control. The provision of interventions aimed at assisting teens in being effective and consistent contraceptive users depends on an ability to predict those adolescents who may have trouble using birth control.

Methods

This study utilized a pre-experimental research design which consisted of four major components. First, adolescents who expressed a desire to use oral contraceptives were interviewed at their initial family planning visit. (Approximately 70% of teens who report using contraception use birth control pills (Dryfoos, 1982).) Three family planning clinics in the Oakland, California area served as data collection sites during the summer of 1986. These clinics were chosen to provide a mix of races and socioeconomic levels among the teens. The interview sample consisted of 76 adolescents (17 years or younger) who attended one of the three clinic sites on randomly selected days. (All teens who received pills during the four selected clinic sessions were invited and agreed to participate in the study.) All interviews with study participants were conducted by the author.

Second, the teens who completed initial interviews were tracked three months later to see if they returned for their required blood pressure

check. (Medical protocols regulating the prescription of oral contraceptives requiring a blood pressure check for all women after three months of using the pill.) Those returning to the clinic (42 teens--55% of the original sample) were interviewed again; this interview concerned their actual experience in the use of contraception.

Third, information was obtained on those adolescents failing to return to the clinic for their three-month follow-up check. Phone interviews were completed with those teens who could be located at the time of three-month follow-up. Although arrangements for phone contact were made with all study participants at the time of their initial clinic visit, this proved to be inadequate for actual follow-up. Sixteen phone interviews (21% of the original sample) were completed while 18 teens (24% of the original sample) could not be located. These phone interviews collected information on the reasons for non-return to the clinic and problems in adherence to the contraceptive routine.

Fourth, a random sample of 218 adolescent client charts were pulled to abstract data related to demographic characteristics, reproductive history, information regarding the initial clinic visit, and return to the clinic for a blood pressure check. Random sample data provided the initial base of a model predicting clinic return. In addition, these data were used to investigate possible biases resulting from sample selection methods and to increase the generalizability of the study.

Sample Description

Characteristics of the samples used in this study are presented in Table 1. The random and interview samples are largely similar; the average age of teens in both was 15-1/2 years with over 90% reporting having had intercourse. The average age at first intercourse was just over 14 years and most reported delays in beginning to use contraception. Over a third reported using some birth control method previously--most used a condom. The rate at which teens returned to the clinic for follow-up was not statistically different for the two groups. Important differences in the two samples were related to menstrual regularity and the incidence of sexually transmitted diseases (STD). Teens in the interview sample were more likely to have irregular periods and to have an STD diagnosed at the initial clinic visit.

TABLE 1
SELECTED CHARACTERISTICS OF ADOLESCENT ORAL CONTRACEPTIVE USERS
RANDOM AND INTERVIEW SAMPLES

Characteristic		Random Sample N	(%)	Interview Sample N	(%)
Demographics					
AGE	mean =	15.4 yrs		15.6 yrs	
RACE	White	28	(39)	37	(51)
	Black	34	(48)	32	(39)
	Hispanic	6	(8)	2	(3)
	Other	3	(4)	5	(7)
	Unknown	147	--		
SOURCE OF MEDICAL CARE	None	64	(29)	45	(60)
	Private Dr.	33	(15)	4	(5)
	HMO	76	(35)	17	(22)
	Hospital	27	(12)	1	(1)
	Public Clinics	18	(9)	9	(12)
Medical History					
AGE OF MENARCHE	mean =	12.7 yrs		12.1 yrs	
MENSTRUAL PERIODS	Regular	190	(88)	56	(74)
	Irregular	28	(12)	20	(26)
Contraceptive History					
EVER HAD SEX	No	18	(9)	7	(9)
	Yes	200	(91)	69	(91)
AGE AT 1st INTERCOURSE	mean =	14.3 yrs		14.2 yrs	
SEXUALLY ACTIVE NOW	No	75	(37)	22	(30)
	Yes	125	(63)	47	(70)
	NA	18	--	7	--
EVER USED BIRTH CONTROL	No	127	(64)	43	(63)
	Yes	73	(36)	26	(37)
	NA	18	--	7	--

Characteristic		Random Sample N	(%)	Interview Sample N	(%)
Pregnancy History					
EVER PREGNANT	No	178	(89)	58	(86)
	Yes	22	(11)	11	(14)
	NA	18	--	7	--
FEARS PREGNANCY NOW	No	129	(86)	57	(83)
	Yes	21	(14)	12	(17)
	NA	18	--	7	--
	Unknown	50	--		
General & GYN Health History					
HEALTH PROBLEMS	None	121	(55)	24	(32)
	mean =	.63		1.34	
PREVIOUS PAP SMEAR	None	158	(73)	55	(72)
	< year ago	44	(20)	18	(24)
	> year ago	16	(7)	3	(4)
Clinical Report on Visit					
EXAM RESULT	Normal	201	(92)	68	(89)
	Abnormal	17	(8)	8	(11)
LAB TESTS	Normal	178	(81)	60	(78)
	Yeast inf.	20	(9)	2	(3)
	STD	20	(10)	14	(19)
REFERRAL	No	211	(92)	70	(92)
	Yes	17	(8)	6	(8)
Follow-up					
RETURN FOR BLOOD PRESSURE CHECK	No	108	(49)	42	(55)
	Yes	110	(51)	34	(45)

Measures

Demographic information was collected from medical charts and interviews. Variables of interest included: age, education, race, and household composition. Reproductive health history data (age of

menarche, age of first intercourse, frequency of intercourse, previous birth control use, previous pregnancies, and general health status) were collected from the participant's medical chart.

The initial face-to-face interviews focused on the teen's decision-making regarding birth control use and on her perceptions of oral contraceptive use. Questions were derived from a social learning model of contraceptive use developed by the author (Balassone, 1987). The specific areas addressed in these interviews fell into two categories. First, the antecedent cues and consequences controlling contraceptive behavior were of interest. Included were the following variables: probability of pregnancy, costs and benefits of birth control use, costs and benefits of pregnancy, models of birth control use, support from partner and parents, and future goals and plans. In addition, variables related to the impact of the teen's cognitions on contraceptive use were included. For example, information was sought on: the types of information teens have regarding birth control, pregnancy risk, and options in pregnancy; views about individual susceptibility to pregnancy; expectations regarding the seriousness of pregnancy; and factors serving as motivators for contraceptive behavior.

For teens who returned for blood pressure checks and refills of their pill prescriptions, questions about their experience in the use of contraception were assessed. The personal and environmental factors facilitating and limiting consistent and effective use of contraception were investigated.

Phone interviews were used to gather information about the group of adolescents failing to return to the clinic. These interviews verified the teen's discontinuation of contraceptive use.

Results

Developing a model to predict clinic return for adolescent oral contraceptive users required three steps. First, a discriminant analysis was used to extract the best set of medical history variables which predicted clinic return. This analysis used the random sample data; that is, the data available from the medical charts of 218 teens. Next, data from the medical charts of adolescents who were interviewed were used to evaluate the power fo the initial prediction model. Lastly, the model was improved by adding information from individual interviews. The goal of such a prediction model was to find an optimal set of variables (or risk factors) which predict clinic return and continued birth control use.

Teens who fail to return for follow-up appointments are less likely to be consistent and effective users of birth control. In another study of oral contraceptive use (Shea et al., 1984), 72% of teens failing to

return to the family planning clinic for a blood pressure check were found to be inconsistent users. Among the adolescents interviewed for the study reported here, all of those recontacted had discontinued birth control use and 69% were at risk of unintended pregnancy. This high rate of inconsistent use among teens not returning to the clinic suggest that factors related to clinic return are also indicative of consistency in method use. The ability to identify adolescents at risk for non-return is a prerequisite, therefore, to the provision of interventions aimed at increasing the use of birth control and reducing unwanted pregnancies.

The Initial Prediction Model

Discriminate analysis was used to distinguish between the two groups of interest--shows and no-shows for clinic follow-up. Discriminant analysis is basically a scoring system that extracts the linear combination of independent variables which most accurately classifies individuals with regard to a specified dependent variable (Morrison, 1976). The linear combination of independent variables is called a discriminant function. The function is calculated from the observed values of the independent and dependent variables in the sample. The goal of analysis is to find the discriminant function that maximizes the separation of the groups of interest (Gondek, 1981). In other words, the weights on the independent variables are chosen so as to provide scores which most clearly place the individual case in one group over another. The resulting discriminant function can the be used to classify a new set of observations with regard to the dependent variable. The aim of the specific analysis here was to identify the set of independent medical history variables which best classified individual teens as to whether or not they showed for a blood pressure check. This initial analysis used the medical history data for the random sample (n=218).

Bivariate relationships between medical history variables and the adolescent's return or failure to return for a three-month blood pressure check informed the multivariate analysis. In addition, variables hypothesized by the researcher as having a role in clinic return were included. The following variables were selected for investigation: 1) age of first intercourse; 2) time elapsed between first intercourse and clinic visit; 3) whether teen presented at the clinic with a sexually transmitted disease; 4) number of present health complaints; 5) whether teen was referred for additional tests; 6) time elapsed since last pap smear; 7) whether teen experienced irregular periods; 8) result of pelvic exam--normal or abnormal; 9) number of present gynecological complaints; 10) whether teen had ever used birth control; 11) whether teen was ever pregnant; 12) whether teen feared a pregnancy at her clinic visit; 13) whether teen had more than one sexual partner; and 14) clinic where teen was served.

Table 2 provides summary statistics for the model which best distinguishes teens who return to the clinic from those who fail to return. Least likely to return to the clinic were teens who had a sexually transmitted disease, had to be referred for additional tests, had irregular periods, and had a pap smear over a year prior to the initial visit.

TABLE 2

SUMMARY STATISTICS AND DISCRIMINANT FUNCTION COEFFICIENTS
THE INITIAL PREDICTION MODEL
N=218

Eigenvalue	.098	
Canonical Correlation	.269	
Wilks' Lambda	.928	(p=.26)
Total cases correctly classified	61.2%	
No-shows correctly classified	44.1%	
Shows correctly classified	76.2%	
False positive rate	59.4%	
False negative rate	40.0%	

Unstandardized canonical discriminant function coefficients for the independent variables in this model:

had STD	.914
was referred	2.860
ever had papsmear	.485
regularity of menstrual periods	1.410
CONSTANT	-2.160

(Positive discriminant scores are associated with a no-show.)

In Table 2, the percentages of cases correctly predicted are biased upward since the same data were used to calculate the discriminant function and to test that function's ability to predict. The next step is a test of the true prediction ability of this model using the interview sample's medical history data.

Testing the Initial Model

Information on the four independent variables contained in the model was available for the 76 teens interviewed. These data along with the discriminant coefficients presented in Table 2 were used to calculate a discriminant score for each of the 76 teens. These classifications were then compared to the actual outcome of the case; that is, whether

the teen actually showed or not for a blood pressure check. The results are presented in Table 3.

At this point in the data analysis process a decision was made to include only cases where follow-up status was known. Teens who failed to return for follow-up were probably a mix of consistent and inconsistent contraceptive users. For example, six of the adolescents who were not reinterviewed had been visiting the Oakland area for summer vacation. These teenagers may have renewed their prescriptions with other family planning providers when they returned home. The ultimate interest in this study was to predict consistent contraceptive use; subjects who were not interviewed at follow-up, therefore, were separated from the sample with known contraceptive outcome.

TABLE 3

TESTING THE INITIAL PREDICTION MODEL:
CLASSIFICATION RESULTS USING INTERVIEW DATA

CLASSIFICATION	Total Interview Sample (n=76)	Follow-Up Status Known (n=58)
Total correctly classified	62%	67%
No-shows correctly classified	44%	43%
Shows correctly classified	76%	78%
False positive rate	37%	22%
False negative rate	40%	59%

The initial prediction model correctly classified 67% of the interview sample where follow-up status (teens who had stopped using contraception) was known. These results are a bit better than those that would be expected by change alone.

The high false negative rate is of some concern. This model predicted a no-show incorrectly over half the time. This means that a number of teens who were predicted not to return to the clinic did, in fact, return for follow-up. A higher false negative rate was preferred over a high false positive rate from a practitioner's point of view. Use of this model in determining which teens receive intervention may result, therefore, in provision of services to some adolescents who might not need assistance. This has fewer detrimental implications than the reverse situation where adolescents who would eventually fail to return to the clinic are misclassified.

Revising the Prediction Model

Items from initial interviews were used to supplement the model predicting clinic return. Selection of additional variable was based on information from two sources. First the researcher hypothesized a number of variables which might be related to consistency of contraceptive use based on her model of birth control behavior (Balassone, 1987). Second, bivariate relationships between variables constructed from interview items and clinic return were reviewed. The following variables were selected for investigation: 1) score on scale of pill related problems; 2) score on scale of pill benefits; 3) number of pregnancy options teen generated; 4) number of pregnancy-related concerns mentioned by teen; 5) whether teen had accurate birth control knowledge; 6) self-rating of personal pregnancy risk compared to that of others; 7) score on scale of pregnancy benefits; 8) whether the teen engaged in unprotected intercourse; 9) whether teen had decided on pill as birth control method prior to initial visit.

Discriminant analyses were done with these additional variables. These analyses used only those cases where outcome was known (n=58). Table 4 presents the summary statistics and discriminant function coefficients for the revised prediction model.

Most associated with failure to return to the family planning clinic are: referral for other testing, pap smear over a year prior to the initial clinic visit, irregular periods, presence of a sexually transmitted disease, view of oral contraception as having high costs, inability to generate options, a view of reduced personal risk for pregnancy, and a less firm decision to use the pill. This model classified 79% of the cases correctly--80% of no-shows and 78% of shows were correctly identified. This rate remains upwardly biased since classification results were obtained using the same data that were used in calculating the discriminant coefficients. This represents substantial progress in the development of a valid and useable model. Interview items did help distinguish teens at risk for non-return to the clinic and discontinuation of birth control use.

The revised model made some improvement on the false positive rate. Only 9% of the sample were predicted to show but actually failed to do so. The false negative rate remained rather high (43%). Further testing and refinement of the model is necessary. The reduction in the interview sample size due to the loss of 18 subjects at follow-up limits the generalizability of the above analyses. Additional work now being done involves the collection of data on a larger group of adolescents.

TABLE 4

SUMMARY STATISTICS AND DISCRIMINANT FUNCTION COEFFICIENTS
THE REVISED PREDICTION MODEL
N=58

Eigenvalue	.384	
Canonical Correlation	.530	
Wilks' Lambda	.714	(p=.01)
Total cases correctly classified	78.6%	
No-shows correctly classified	80.0%	
Shows correctly classified	78.0%	
False positive rate	9.4%	
False negative rate	42.9%	

Unstandardized canonical discriminant function coefficients for the independent variables in this model:

had STD	.216
was referred	1.854
ever had papsmear	.946
regularity of menstrual periods	.806
personal pregnancy risk	-.528
costs of pill use	.739
ability to generate options	-.839
decision to use pill	-1.929
CONSTANT	1.749

(Positive discriminant scores are associated with a no-show.)

Discussion

First, it is important to note some of the limitations inherent to this research. The samples are small and cannot be thought of as representative of all adolescent oral contraceptive users. Only one method of birth control has been investigated and the results of this study cannot be extended to teens who use other methods of contraception. This study, therefore, provides a preliminary look at oral contraceptive use and subsequent investigations are needed to lend support to the results reported here.

The fact that about half of the teens who begin using oral contraceptives will discontinue that use (and be at risk for pregnancy) reminds practitioners that a decision to use birth control is not enough to ensure continued, effective use. The research presented here suggests that an adolescent's use of birth control is influenced by a number of cognitive factors--appraisal of the costs associated with contraceptive use, a personal sense of susceptibility to pregnancy, and problem-solving abilities. Practitioners who work with teens need to

provide concrete guidance and repeated reminders about contraception. It may be that these more immediate consequences are more effective in reinforcing birth control use than the more remote possibility of getting pregnant.

This research provides practical information to family planning practitioners about factors which may identify teens at risk for contraceptive discontinuation. Clinic staff can use these risk factors to identify who might fail to return to the clinic and discontinue birth control use.

Adaptation of the prediction model to family planning practice can be accomplished quite easily. Adolescent pill users can be evaluated in each of the risk areas during their initial family planning clinic visit. Once the risk factors have been assessed, there will be a need to provide some intervention aimed at increasing the teen's likelihood of return to the clinic.

In general, this intervention will take the form of education provided as part of the clinic visit. The extra time spent with at-risk adolescents should involve both general health care education and information specific to oral contraceptive use. For example, teens referred for additional tests need to understand why the test is necessary. They will benefit from very specific instructions regarding the type of test, where they need to go for the test, a plan for getting the test, and the importance of the test's results. Education about the side-effects of oral contraceptives must be included in some detail. Both verbal and written reviews would be helpful and the adolescent should be encouraged to call the clinic if problems arise. Time can also be devoted to teaching techniques for chaining behaviors which will assist teens in remembering to take the pill daily and in planning for consistent oral contraceptive use. Finally, this extra time should also be used to discuss any ambivalence the teen might have about being sexually active or about the use of pills as a contraceptive.

REFERENCES

Alan Guttmacher Institute (1981). The problem that hasn't gone away. New York: Alan Guttmacher.

Balassone, M. L. (1987). Adolescents and birth control: A study of oral contraceptive use. Doctoral Dissertation, University of California, Berkeley.

Baldwin, W. (1982). Trends in adolescent contraception, pregnancy and childbearing. In E. M. McAnarney (Ed.), Premature adolescent pregnancy and parenthood. New York: Gurne & Stratton.

Clark, S. D., Zabin, L. S., & Hardy, J. B. (1984). Sex, contraception and parenthood: Experience and attitudes among urban black young men. Family Planning Perspectives, 16, 77-82.

Cohen, D. D. & Rose, R. D. (1984). Male adolescent birth control behavior: The importance of developmental factors and sex differences. Journal of Youth and Adolescence, 13, 239-252.

Dryfoos, J. G. (1983). Review of interventions in the field of prevention of adolescent pregnancy. Mimeographed copy of Preliminary Report to the Rockfeller Foundation.

Dryfoos, J. (1982). Contraceptive use, pregnancy intentions, and pregnancy outcomes among U.S. women. Family Planning Perspectives, 14, 81-94.

Durant, R. H., Jay, S., Linder, C. W., Shoffitt, T., & Litt, I. (1984). Influence of psychosocial factors on adolescent compliance with oral contraceptives. Journal of Adolescent Health Care, 5, 1-7.

Ford, K. (1983). Second pregnancies among teenage mothers. Family Planning Perspectives, 13, 268-72.

Foreit, J. R. & Foreit, K. G. (1981). Risk-taking and contraceptive behavior among unmarried college students. Population and Environment, 4, 174-88.

Furstenberg, F. F., Shea, J., Allison, P., Herceg-Baron, R., & Webb, D. (1983). Contraceptive continuation among adolescents attending family planning clinics. Family Planning Perspectives, 15, 211-217.

Gondek, P. C. (1981). What you see may not be what you think you get: Discriminant analysis in statistical packages. Educational and Psychological Measurement, 41, 267-82.

Hayes, C. D., Ed. (1987). Risking the future: Adolescent sexuality, pregnancy, and childbearing. Washington, DC: National Academy Press.

Hofman, A. D. (1984). Contraception in adolescence: A review of psychosocial aspects. Bulletin of the World Health Organization, 52, 151-62.

Litt, I. F. & Cuskey, W. R., & Rudd, S. (1980). Identifying adolescents at risk for noncompliance with contraceptive therapy. Journal of Pediatrics, 96, 742-45.

Mindick, B. & Oskamp, S. (1982). Individual differences among adolescent contraceptors. In I. Stuart & C. Wells (Eds.), Pregnancy in adolescence: Needs, problems, and management (pp. 140-76). New York: Van Nostrand.

Morrison, D. G. (1976). Multivariate statistical methods. New York: McGraw-Hill.

Morrison, D. M. (1985). Adolescent contraceptive behavior: A review. Psychological Bulletin, 98, 538-68.

Nathanson, C. A. & Becker, M. H. (1985). The influence of client-provider relationships on teenage women's subsequent use of contraception. American Journal of Public Health, 75, 33-38.

Scher, P. W., Emans, S. J., & Grace, E. M. (1982). Factors associated with compliance to oral contraceptive use in an adolescent population. Journal of Adolescent Health Care, 32, 120-23.

Shah, F. & Zelnik, M. (1980). Sexuality in adolescence. In B. B. Wolman & J. Money (Eds.), Handbook of human sexuality (pp. 83-92). New Jersey: Prentice-Hall.

Shea, J. A., Herceg-Baron, R., & Furstenberg, F. F. (1984). Factors associated with adolescent use of family planning clinics. American Journal of Public Health, 74, 1227-30.